



PRACTICE ABSTRACT
Digital technology

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TRACE - FOSTERING TREE MONITORING TECHNOLOGIES TO SUPPORT CLIMATE ADAPTATION AND MITIGATION

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TRACE is a project that aims to foster tree monitoring technologies for forest resources to support climate adaptation and mitigation through enhanced forest management and certification practices.

The project implements a small-scale monitoring network to trial the use of innovative Internet of Things (IoT) technologies to continuously monitor tree growth and health. There is a strong connection between tree ecosystems and climate. Climate change impacts on a forest's ability to absorb carbon, and on biodiversity and habitat degradation.

The TreeTalker tool collects reliable data that informs forest owners' management decisions and the forest certification process. The outcome is an improved resilience of fragile ecosystems.

TreeTalker is an innovative and low-cost device that is attached to selected trees within the forest. Sensors in the device measure various eco-physiological/biological parameters, such as water transport within the tree, water content of the stem, diameter growth, and the quality/quantity of the tree foliage.

Application scenario

Forestry Information and Management System (FMIS) for tree parameters (growth, water exchanges, health) for enhanced management and certification practices

Digital technologies

Sensors, connectivity to automatically deliver data, cloud-based platform for storing and analysing data, application to access and visualise data

Socio-economic impact

- Economic: organisation, autonomy, less time-consuming, less financial risk, resilience; value chain transparency
- Environmental: ecosystem services, biodiversity and plant health
- Social: access to information

More info: <https://www.pefc.org/what-we-do/our-collective-impact/our-projects/fostering-tree-monitoring-technologies-to-support-climate-adaptation-and-mitigation>



Purpose of the tool

TRACE is an initiative to monitor the physiological parameters of trees by using IoT technologies in a local network setting. PEFC sustainable forest management certification relies on dedicated, and often time-consuming, field measurements of several biotic and abiotic indicators. The continuous measurement of vegetated ecosystems' ability to store carbon and be resilient to environmental changes is possible through an increased density of observations of tree health, growth and water exchange. Enhanced access to this information enables forest owners to act faster and to adapt their forest management practices in response to any changes within their forest. It also enables certification bodies to carry out their verification tasks more efficiently, thereby improving the certification process.



Source: [PEFC](#)

Description of the tool

The project sets up a small-scale monitoring network within 160 hectares of privately-owned forest in the Umbria region of central Italy. It relies on the latest-generation of IoT technologies, including an online platform for the acquisition, transmission, processing and storage of data. TreeTalker is an innovative and low-cost device, which is attached with its sensors to selected trees within the forest. It measures various eco-physiological/biological parameters, such as water transport within the tree, water content of the stem, diameter growth, and the quality/quantity of tree foliage. The sensors transmit the data to the cloud-based platform, to be processed and correlated with environmental data to provide information about the growth and health status of trees. Specific algorithms enable a near real-time processing of, and access to, information. The Italian PEFC-certified forest is one of the 150 forest sites that can be studied through [CMCC](#) solutions, to build a “worldwide tree network” distributed across the most vulnerable and representative forests of the world, from boreal to temperate and tropical regions.

Areas of socio-economic impacts

Social	Improved access to information on the state of forests.
Economic	Better decision-making in forest management and certification based on fast and reliable information, resulting in improved resilience and transparency of value chains.
Environmental	Enhanced environmental services to society (healthier landscapes, biodiversity, etc.) and strengthened status and resilience of forests.



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